WHAT COMES AFTER SECOND ORDER CYBERNETICS?

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In recent years the field of cybernetics has been described as consisting of two bodies of work created in two time periods: first order cybernetics from the late 1940s until about 1975, and second order cybernetics from the mid 1970s to the present. Each period lasted about 25 years. What comes next? I shall describe here what I think comes next and how the new point of view emerged, at least in my own thinking.

I have been a member of the group of people who worked to develop the ideas of second order cybernetics and to arouse interest in these ideas among academics in a variety of disciplines. In the language of Thomas S. Kuhn we were attempting to make a scientific revolution. A scientific revolution is marked by the emergence of "incommensurable definitions." Consequently the differences between first and second order cybernetics were repeatedly stated. The way others and I defined the differences are summarized in Table 1.

Table 1

DEFINITIONS OF FIRST AND SECOND ORDER CYBERNETICS

Author	**First Order Cybernetics**	**Second Order Cybernetics**

Von Foerster	the cybernetics of observed systems	the cybernetics of observing systems
Pask	the purpose of a model	the purpose of a modeler
Varela	controlled systems	autonomous systems
Umpleby	interaction among the variables in a system	interaction between observer and observed
Umpleby	theories of social systems	theories of the interaction between ideas and society

After about twenty years of making the case for second order cybernetics, it seemed to me that we had largely succeeded. The idea of perspectival observation – what a person sees depends upon his or her background – had become widely accepted in scientific circles even if cyberneticians did not receive much credit for the change in thinking. Furthermore, I decided that not much more could be done to interest other scholars in the particular way that cyberneticians described constructivism.

There are additional reasons for creating a new, well-defined position. For many years I thought that second order cybernetics could easily encompass my interest in social systems. However, others who were developing second order cybernetics said that the distinctions I was making were not what they had in mind. I now believe that rather than try to stretch the conception of second order cybernetics to encompass both biological and social phenomena, it would be more fruitful to distinguish between these two points of view in order to create richer descriptions of each.

Another reason for my interest in creating a distinction between biological and social cybernetics is that biological cybernetics emphasizes a different distinction than the one I want to emphasize. Biological cybernetics distinguishes between the philosophies of realism and constructivism. I wish to emphasize the difference between the natural sciences and the social sciences. My motivation arises from my teaching experience. At The George Washington University I teach a course in the philosophy of science for entering doctoral students in management. The literature on the philosophy of science uses primarily examples from the natural sciences, especially physics. However, social systems are quite different from physical systems. When theories of physical phenomena change, we assume that the phenomena themselves do not change. For example, when physicists changed their thinking from classical Newtonian mechanics to quantum mechanics, the behavior of atoms did not change. But when theories of social systems change, social systems operate differently. For example, the theories of Adam Smith, Karl Marx, John Maynard Keynes, and Milton Friedman did change the way social systems operated. Hence, in the social sciences there is a circularity or a dialogue between theories and phenomena. This circularity does not occur in the natural sciences, or at least not in the same way. Our use of technology affects the environment, which leads to new technologies, but theories in the natural sciences remain mostly unchanged.

Due to my experience in attempting to promote second order cybernetics I have become interested in what I call “the design of intellectual movements.” A few examples of intellectual movements in addition to second order cybernetics are: process improvement methods in the field of management, the interdisciplinary field of socio-economics, and Vladimir Lefebvre’s idea of reflexive control, that has attracted considerable interest in Russia.

Essential to the design of intellectual movements is the circularity between theories and phenomena in the social sciences. However, this is not the focus of attention of biological cybernetics. Biological cyberneticians emphasize the fact that our conceptions of observed phenomena are our own constructions. This point of view has great implications for how human beings communicate with one another and strive to achieve agreement. But once we have an improved understanding of *how* to communicate, *what* will we communicate about and *how* can we be more effective in changing social systems? My answer is to design and encourage intellectual movements, or the widespread adoption of ideas that we believe will have a beneficial impact on the operation of social systems. This is the work that I think of as social cybernetics.

I feel that a new organizing idea is needed to advance the field, or at least my work in the field. I call the new point of view social cybernetics or the cybernetics of conceptual systems. For an overview of how this third point of view is different from both first order cybernetics and second order cybernetics, see Table 2. In the table “engineering cybernetics” refers to first order cybernetics and “biological cybernetics” refers to second order cybernetics. The column called “social cybernetics” describes the view that I am advocating.

Table 2

THREE VERSIONS OF CYBERNETICS

	Engineering Cybernetics	**Biological Cybernetics**	**Social Cybernetics**
The view of epistemology	a realist view of epistemology: knowledge is a "picture" of reality	a biological view of epistemology: how the brain functions	a pragmatic view of epistemology: knowledge is constructed to achieve human purposes
A key distinction	reality vs. scientific theories	realism vs. constructivism	the biology of cognition vs. the observer as a social participant
The puzzle to be solved	construct theories which explain observed phenomena	include the observer within the domain of science	explain the relationship between the natural and the social sciences
What must be	how the world	how an	how people create,

explained	works	individual constructs a "reality"	maintain, and change social systems through language and ideas
A key assumption	natural processes can be explained by scientific theories	ideas about knowledge should be rooted in neuro-psysiology	ideas are accepted if they serve the observer's purposes as a social participant
An important consequence	scientific knowledge can be used to modify natural processes to benefit people	if people accept con-structivism, they will be more tolerant	by transforming conceptual systems (through persuasion, not coercion), we can change society

Of course, I am not the only person interested in developing the idea of social cybernetics. Niklas Luhmann has written about self-reference and autopoiesis in biological, psychological and social systems, and Felix Geyer has organized a socio-cybernetics working group within the International Sociological Association. I look forward to working with others in further developing cybernetics ideas in the realm of social systems.